Furthermore, claims 1 and 2 are rejected under 35 U.S.C. 103 as being unpatentable over Wygnanski.

Agent for Applicant respectfully responds by cancelling claims 1-2 and adding new claims 3-22 as indicated below:

1. [Cancel]

2. [Cancel]

3. An apparatus for the mixing of at least one fluid stream having various spatial positions and properties and creating streamwise vortices comprising:

at least one chamber having a proximal end, a distal end, a corresponding actuator for forcing the mixing of at least one fluid stream, an inlet means for receiving at least one fluid stream at said proximal end and a divider means for separating at least one fluid stream mounted within at least one chamber at said proximal end.

4. An apparatus for mixing as claimed in claim 3 wherein said inlet means is at least one inlet port.

5. An apparatus for mixing as claimed in claim 4 wherein said divider means is at least one splitter plate having a trailing edge.

6. An apparatus for mixing as claimed in claim 5 wherein at least one splitter plate extends from said proximal end of at least one chamber to a point towards said distal end of at least one chamber allowing for the separation of at least one fluid stream until mixing beyond said trailing edge of at least one splitter plate.

7. An apparatus for mixing as claimed in claim 3 wherein at least one splitter plate may be straight or nonhomogeneous-formed.

8. An apparatus for mixing as claimed in claim 3 wherein said corresponding actuator for forcing the mixing is a narrow frequency band independent of said fluid's convection velocity.

9. An apparatus for mixing as claimed in claim 8 wherein said narrow frequency band is generated by a means selected from the group consisting of a forced flap in said trailing edge of at least one splitter plate, a forced membrane, a piston pump and a periodic valve upstream of said trailing edge of at least one splitter plate.

10. An apparatus for mixing as claimed in claim 8 further comprising a periodic velocity component generated from said corresponding actuator.

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11. An apparatus for the mixing at least one fluid stream having various spatial positions and properties and creating streamwise vortices comprising:

at least one chamber having a proximal end, a distal end and a corresponding actuator for forcing at least one fluid stream.

12. A process for the mixing at least one fluid stream and creating streamwise vortices comprising:

introducing at least one fluid stream into at least one chamber having a proximal end and a distal end, through an inlet means for receiving at least one fluid stream at said proximal end of at least one chamber;

separating at least one fluid stream within at least one chamber by a divider means mounted at said proximal end of at least one chamber;

applying a corresponding actuator for forcing the mixing of at least one fluid stream downstream of said divider means.

13. A process for the mixing at least one fluid stream as claimed in claim 12 wherein said divider means is at least one splitter plate having a trailing edge wherein at least one fluid stream mixes downstream of said trailing edge of at least one splitter plate creating said streamwise vortices.

14. A process for mixing at least one fluid stream as claimed in claim 13 wherein at least one splitter plate extends from said proximal end of at least one chamber to a point towards said distal end of at least one chamber for separating at least one fluid stream until said trailing edge of at least one splitter plate and generating vortices for mixing at least one fluid stream.

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15. A process for mixing of at least one fluid stream as claimed in claim 14 further comprising matching at least one chamber to said corresponding actuator wherein said corresponding actuator is a narrow frequency band independent on said fluid convection velocity.

16. A process for mixing at least one fluid stream as claimed in claim 15 wherein said narrow frequency band is generated by a means selected from the group consisting of a forced flap in said trailing edge of at least one splitter plate, a forced membrane, a piston pump and a periodic valve upstream of said trailing edge of at least one splitter plate for forcing the mixing of at least one fluid stream.

17. A process for mixing at least one fluid stream as claimed in claim 16 further comprising producing a periodic velocity component generated from said corresponding actuator.

18. A process for mixing at least one fluid stream as claimed in claim 12 wherein said mixing process reduces acoustic noise.

19. A process for mixing at least one fluid stream as claimed in claim 12 wherein said mixing process improves chemical reactor instability.

20. A process for mixing at least one fluid stream as claimed in claim 12 wherein said mixing process improves flow separation control.

21. A process for mixing at least one fluid stream as claimed in claim 12 wherein at least one fluid stream has sufficiently high initial velocity ratios of (U1-U2)/(U1+U2) and (U1+U2)/2 for no external forcing.

22. A process for mixing at least one fluid stream as claimed in claim 12 wherein said mixing process enhances the heat transfer rate for heat exchangers.

Discussion of Claims

Examiner has rejected claims 1-2 as being unpatentable over Wygnanski. Agent for Applicant has cancelled claims 1 and 2 and added new claims 3-22. The following discussion outlines the differences between Wygnanski and the claimed invention as an aid to the Examiner in understanding the claimed invention.

Wygnanski used a now well-known technique, which is based on inherent Kelvin-Helmholtz instability mechanism. The claimed invention however depends not only on Kelvin-Helmholtz instability mechanism, but also on a new instability mechanism, which is related to the streamwise vortices, some of which, for example are generated from the corner vortices originated from the corner between the splitter plate and side wall.